condition, he has the same miserable urinary incontinence he had in the beginning. Perhaps, if the X-Ray therapy had been started earlier, both before the perineal repair operation, and immediately after it, there might have been more primary healing and a permanently closed perineum obtained.

Case 4. J. G., No. 43540, American, Age 44. Entered December 12, 1919. Complaint: Dizzy spells and urinary incontinence. Family history negative. Past history: Insomnia and chronic arthritis in all joints off and on for years. Dizzy spells and headaches for last six years relieved by digitalis and whisky. Pain in heart and swelling of the feet at times. Two Neisser infections, and has been treated for strictures since 1908.

Present illness: Had an external urethrotomy done in 1910, for his strictures. Has had dribbling since then, especially when asleep and when tired after working. Has worn a urinal and been told by several doctors that it was the only relief for him.

Physical findings: Heart absolute irregularity, rapid, weak pulse, no murmurs. Genitalia: Chronic epididymitis both sides. Urine clear. Number 30 Fr. sound easily to bladder. Prostate small, lobes nodular, base infiltrated into vesicles especially right. Prostatic sulcus deep. Cystoscopic and urethroscopic examination: Capacity 32 ounces; bladder wall and ureteral orifices normal. Neck of bladder regular in outline anteriorly, with a deep cleft in the floor of the urethra between the lateral lobes of the prostate. The cleft extends forward through the prostatic and membranous urethras, showing both sphincters had been cut. The sphincters did not close in the normal folds but remained relaxed and were sluggish. Varumontanum not seen.

December 9, 1919, Operation under two grains of tropocaine in spinal fluid. Suprapubic cystotomy: Denuded an area in the bladder neck covering the ends of the cut internal sphincter, and dissected out the scar tissue. Approximated the ends of the muscle with four fine chromic catgut sutures. Sewed in one half inch rubber drainage tube in the suprapubic wound. Injected one and one-half grains more of tropocaine in the spinal fluid, one hour and a half after the first injection. Put the patient in the lithotomy position and made an inverted Y incision in the perineum. The scar tissue was dissected out until the healthy muscle ends were found, without opening the urethra. The ends of the urethral and perineal muscles were approximated and the wound closed without drainage. Negative pressure apparatus applied to the suprapubic bladder tube to keep internal sphincter dry as possible.

In one month the wounds were healed and the patient was urinating normally, getting up once during the night. At the end of six weeks a 29 Fr. sound was passed and a cystourethroscopic examination made showing a median bar across the former cleft in the vesical orifice, and with normally functionating internal and external sphincters on withdrawing the urethroscope.

January 19, 1920, dismissed with urinary condition cured.

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INDUSTRIAL MEDICINE. *

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For the first time in the history of this society a new section on Public Health and Industrial Medicine makes its debut on the program as an important branch in the field of scientific medicine. These specialties should be devoted in their fullest measure to educational problems in preventive, industrial and socialized medicine, so as to offer to the general profession a knowledge of subjects that are correlated with medicine. The practicing physician trained in curative medicine deals entirely with the individual while the sanitarian, the industrial physician, or the social worker deals with the problems that confront the whole of the society. All factors in public health or social economics are fundamentally medical subjects, and consequently the profession should be continually informed of the advances made in these fields of research. Bernardino Ramazzini of the University of Padua, whose death occurred two hundred years ago, and probably the earliest teacher in the study of the diseases of artificers, is reputed to have said: "Man must work to live, and if the work itself brings death a vicious circle is created." This observer realized that nothing comes closer to actual humanitarianism than prophylaxis of the ills caused by special occupations. When the steam engine was invented, modern machinery was the result, and manufacturing became the foundation of commerce and industry. All efforts and skill in chemical and mechanical science were brought to bear to increase output and convert raw materials into finished products. The human machine element was lost sight of in this evolution for the supremacy of trade until lay workers connected with social agencies, statisticians in life insurance companies, and medical men became aroused by the spectacle of the human wastes, who met their early demise, or filled our institutions and hospitals.

The studies of occupational diseases and hygiene by such Europeans as Rambousek, T. M. Legge and Sir Thomas Oliver combined with the pioneers in the field in America, viz: Kober, Alice Hamilton, Gilman Thompson, Hayhurst and others are epoch making. The research in fatigue by Josephine Goldmark and Professor Lee, the compilation of mortality statistics from consump-

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tion in the dusty trades by Frederick Hoffman, safety in industry by Tolman and the labors of the New York Ventilation Commission are only a few illustrations of the advances made along these lines of endeavor. The culmination of the wrongs and injustice done to workers, through carelessness and injury, was instrumental in the legislative measures that brought about the Workingman's Compensation Act. The passage of these laws was the measure which stimulated a demand for well-trained industrial surgeons, men of education, with vision and human interest.

Industrial medicine may appear to the skeptic in the profession to possess a character dangerous to its best interests. He may think that he sees in it the characteristic earmarks of contract practice, or socialized medicine. Such fears need not be entertained, as the fact is now definitely recognized among the great captains of industry that medicine plays an increasingly important part in the whole structure of their various organizations, thereby furnishing a great and parallel increase in all the various activities of medicine. What the profession must demand is that medicine shall not be exploited, and that is one of the chief purposes for which medical societies are grouped. It is illogical to presume that general medicine as it is daily practiced among the laity could be applied collectively to the army, for instance, without a definite knowledge of military training in the specialized fields, and the same is true of industrial medicine and public health.

The great corporations and railroads have realized that in the past they were short-sighted in providing cheap medical service. It was this class of medical men who earned the stigma of the company doctor, and did not command the respect of either the employers or employee, or of his colleagues in the profession. This type was the old time doctor who was primarily a first-aid man. The employer reluctantly learned that such service was the most expensive, as it is far more economical to prevent than to cure. So in the past five years the plant surgeon has risen to a place in the foremost rank of the profession, highly specialized, honorable, and rich in opportunities for human service.

Industrial medicine is not simply a field for the ordinary practice of general medicine or surgery, it is a development which has perfected a specialty in traumatic and occupational diseases, and the means for increased production, healthier and happier workers and decreased labor turnovers.

The scope of the general application of industrial medicine is to the larger group as a unit, and it is in this relation that the main endeavors are centered, although individual medicine is rendered whenever requested. Its specific purpose is prevention, the prevention of occupational diseases and accidents. When these two main issues are applied to the whole group, the humanizing of industry is attained, and a crowning victory for society accomplished. The long hours of labor, the speeding up of machines and other measures promoted by the employer to secure the maximum return from the labor of his employees, are unscientific and unwarranted. To secure the maximum of efficiency from the human machine, the industrial surgeon, virtually a human engineer, acts as the agent for stabilizing labor, thereby facilitating production and helping the worker to do a better day's work and to earn better compensation. These facts most employers now realize.

The trained industrial surgeon, by his methods and process of elimination, makes scientific studies of the hazards of occupation; is able to interpret industrial processes, and clearly understand the various operations of mechanical appliances, and to provide the necessary working environment. The worker in the modern factory should not be denied fresh air, sunshine and good water. These are his natural privileges and environments lacking these things are responsible for many occupational diseases, those resulting from the emanations from fumes, gases, toxic metals, dust, high temperature and humidity. Occupational hygienists recognize that physical breakdown is due to unsanitary working conditions, lack of medical supervision and lack in the recognition and prompt treatment of conditions which lead to invalidism. The employer now realizes that better relations between himself and the worker are possible by the provision of healthful places in which to work.

The most capable individual to estimate the human requirements for filling a job or the placing of the handicap where service can be of most value is the industrial physician, through the medium of physical examinations, whereby physical defects are revealed and detected.

It is estimated by Mock that in the United States there are forty million workers, and of this number about one-tenth are receiving scientific medical supervision. Of this vast industrial army he states that two million lose time yearly entailing a loss of over one day each, 750,000 of more than four weeks, 18,000 are permanently disabled, and 22,000 are killed outright. From an economic standpoint the loss is estimated at eighteen million working days or the working time of 60,000 men per year. Gier states that the noneffectives in the average industrial plants are known to be three per cent. for sickness, two per cent. absences falsely claimed to be sickness, one per cent. lost time due to accidents, or six per cent. in all. When the principles of industrial medicine intelligently applied can reduce these numbers to three per cent., or a gain of 30 workers in every 1000 on the job, the employer as well as the employee is markedly enriched thereby.

The United States Department of Labor investigation concerning accidents in the steel and iron industry found that fractures of all kinds alone constituted 2.6 per cent. of all injuries and that the average of days lost was 55. It is evident that some factor must have entered into the determination of this average, for the figures in no way correspond to those obtained by the American Surgical Association Fracture Committee, their average of time lost being 105 days for all long bones. The conclusion to be drawn is that in industry the rendering of immediate and proper surgical service by a surgeon specializing in traumatic injuries is that factor.

The introduction of plant dispensaries constitutes a medical agency where the "stitch in time" method is practiced; where infections and minor

ailments are nipped in the bud. With skilled trained nurses constantly in attendance, shock and hemorrhage is averted or controlled, the wounds are carefully sterilized and temporarily dressed while the surgeon is being notified. A workman soiled and sweating when injured, burned or sick, dispatched at once to the dispensary or plant hospital and given immediate attention, cleaned and put in a clean bed, has these advantages: his psychology is changed, fear eliminated and confidence established. Such agencies as first aid and transportation of the injured by trained employees in this art are important factors in preventive surgery. Work of rescue in smoke, gas and fumes, the application of artificial respiration by these first aid teams, have materially lessened morbidity and mortality, lessened suffering and shortened hospital days.

The plant surgeon coming directly in contact with the injured, keeps careful records important to the safety man, who after investigation applies the knowledge gained to the prevention of recurrence of similar accidents.

In co-operation with departments of employment where physical examinations are compulsory, the industrial surgeon plays an important role. The elimination of the unfit and the mental deficient, the recognition of infectious diseases, the placing of those with certain defects where they may still be efficient, and the discovery of degenerative diseases are benefits derived from such service. For industry is learning that labor turn-over is costly and is continually adding to the cost of the product.

Comprehensive study and conservative estimates by investigators show that it costs about $40 to hire and train a person for a job. By figuring that about 10 per cent. of the applicants are rejected, it is safe to conclude that the employer has saved $400 for every one hundred applicants. This estimate, however, would be cut in half if the overhead average of $2.50 per capita for medical examinations were charged.

Humane disqualification only must be resorted to, and the surgeon is in duty bound to give his professional reasons and advice to the rejected so that his defect may, if possible, be remedied. Some objections were raised by union labor as to physical examinations on the ground that industry was primarily the cause of these defects. Undoubtedly this is largely true, but alcohol, venereal and other infectious diseases are responsible for a great measure—a problem which industrial medicine must in the future solve.

In the close relation maintained with the welfare department in providing comfortable bathing and washing facilities, clean toilet and rest rooms, sanitary drinking fountains, and eating services, recreational activities, etc., the industrial surgeon acts as a practical hygienist, fostering increased comfort and happiness to the employees and receiving their good will and gratitude.

The introduction of the public health nurse has opened up a new specialty in this field. Her work is fully recognized as essential to industry. Follow up work in treatment of employees, prevention of malingering, teaching hygiene and visiting the homes, rendering first aid, and assisting the plant physician in physical examinations and keeping records, and giving advice to women in industry, doing social welfare work and making periodical sanitary inspections of the plant; this service constitutes preventive as well as economic medicine and tends to improve home conditions and decrease wage losses.

The study of occupational diseases while not new, offers to the industrial M. D. opportunities for research and investigations. Many of our states allow under the Workingmen's Compensation Commission, compensation for occupational diseases, California being one of these. Problems of great magnitude must be decided, such as, whether a worker had tuberculosis before entering a dusty trade, or a degenerative heart condition which was perhaps luetic, rather than resulting from industrial poisons. Our state board of health requires that certain occupational diseases are reportable, as for example: anthrax, compressed air diseases, toxic jaundice, etc. How many of our general practitioners are uncertain in their recognition of occupational diseases, and how often by ascertaining the patient's occupation, the clew to the diagnosis may be found. Plumbism was known to Hippocrates. Michael Angelo, Raphael and Corregio were victims of this disease, and yet we often see painters being operated upon for appendicitis, when colic is the main symptom, and the blue line on the gum is overlooked. Toxic jaundice, a symptom of acute yellow atrophy of the liver, a fatal disease due to the fumes of benzol, t. n. t. and tetra chlorethane, must not be a case for cholecystectomy but one to report for the prevention of other like cases. Chills, fever and sweats are the cardinal symptoms of brass founders' ague, due to zinc fumes; so neither the anophele nor the antidotes for malaria bear any relation as to the cause and cure of such analagous symptoms. Blindness was repeatedly met with in practice, but was methyl alcohol thought of as the causative agent? Dermatitis and exfoliation of the skin is common with dyers and workers in aniline. These are but a few illustrations of common occupational diseases confronted daily. The long list of toxic fumes, gases and dusts, the poisonous metals, such as lead, arsenic, mercury and chrome, the dusty trades, such as felt hat operators, grinders, polishers and cement workers, the diseases of harmful environments, such as caisson disease, trauma, neuroses, occupational cramps, anthrax and the incidents of tuberculosis, afford rich opportunities to the industrial surgeon to study and prevent hazards, thus bringing a keener appreciation of the great service which he can perform to society and of the valuable contributions he is able to make for the enrichment of medical science.

The doctor who merely accepts employment as a factory physician essentially to conduct a dispensary for the purpose of rendering emergency services in cases of accident, and often to protect the interests of the employer as to claims, cannot in the light of what has already been said be classed as an industrial surgeon in the truest sense. The study of industrial physiology in the worker

is a step in industrial research. Output and fatigue, rest, hours of labor, welfare work and food and their relations to efficiency, has been rationally developed by Lee in this promising science. It has two objects: first, the more purely scientific one of learning how the industrial worker actually performs his work, the conditions under which he can work most efficiently and produce the largest output, while maintaining his body in health and in the best condition; second, the more practical object of establishing in the factories the conditions which are conducive to the maximum output, and the maintenance of the maximum power of the worker. As a result of these earnest efforts, both employer and worker will soon recognize that industry must be organized on an intelligent basis, and not as heretofore on a basis of ignorant speculation. A great and virgin field for development still awaits the investigator.

The phenomenal advances made in industry in recent decades, chiefly through the achievements of mechanical and chemical engineering, has improved automatic machinery and developed new processes, but has not succeeded in eliminating the human worker. The human machine, therefore, the most intricate of all, has its limitations, due to fatigue, and must be understood, watched and not abused. Industrial medicine and sanitation has made scientific progress since the war, and individual investigators such as Florence, Lee, Gilbreth and Spaeth have shed much light on this subject of fatigue. As fatigue delays work, spoils material, diminishes output, causes accidents, sickness, and absences, naturally efficiency is diminished by it. How to minimize fatigue and maintain the efficient working power of the worker, constitutes one of the great industrial problems of the day.

The unique observations of Gilbreth with the use of the cinematograph for the study and curtailing unnecessary movements, thereby conserving much energy and overcoming fatigue, has resulted in increased output. The application of rest periods, at intervals, by Taylor had the effect of increasing production without detriment to the worker. Shorter hours in the British munition factories, where the working time was reduced from ten to eight hours, did not reduce the output. These examples afford practical illustration of the value of science applied industrially.

Industrial hygiene has made progress by leaps and bounds in the environment of the factory. The problems of ventilation, high temperature and humidity, are particularly interesting. Haldane (British), Lee, Hill, Winslow (American), whose books on these problems are epoch-making, have revolutionized the old theories of Petten-Koffer that CO_2 was the dangerous factor in ventilation. These investigators have proved by research that the ill effects of confined air are not due so much to the chemical impurities in the air, as to physical ones, such as increased temperature, humidity and stagnation of air about our bodies. It is these conditions which, when maintained, produce fatigue, lassitude, anemia, increased metabolism, loss of resistance and a predisposition to acute and chronic diseases in the worker. Tersely, as Lee has stated, ventilation is not a chemical but a physical and not a pulmonary but a cutaneous problem.

Industrial illumination is another factor in occupational hygiene, that the attention of architects has been called to, in the construction of modern factories. Inadequate natural or artificial illumination has its consequent effects not only on the cleanliness and cheerfulness of the workshop, but it decreases production and increases spoilage. There occur 25 per cent. more accidents in dark shops, and in night work. Poor lighting causes eye strain and impaired health in the employee.

Such public health matters as epidemiology, safe water supplies, waste disposal, insect control, all play an important role in safeguarding the worker in industry.

As sanitation is linked to preventive medicine, so is safety to preventive surgery. Accident prevention was the outcome of our State Compensation Acts. The slogan, "Safety First," was born as a result. Van Schaack of the Aetna Life, quotes that "on a basis of 300 working days of eight hours each, the startling and shocking record is that a workman is killed every four minutes, and one injured every four seconds." Viewing this situation from a humanitarian standpoint, we see clearly that the prevention of preventable accidents is not an altruistic accomplishment. To eliminate pain, as far as possible, to heighten the enjoyment of life, and reduce sorrow and misery, is a duty which admits of no arguments. From an economic viewpoint, picture the disaster of the victim of a fatal or serious accident; if a fatal one, his loss of wages, hospital and funeral expenses, the struggles and hardships of dependents, or if blinded or totally disabled, the inevitable burden to the family and community. The employer is liable for damages and the consumer experiences a rise in prices. There is greatly diminished efficiency after an accident, as the shock to the other workers curtails their productivity and at times even causes complete stoppage of work. The incidents of time consumed, material spoiled, and the training of a new employee, are matters that appeal economically to all employers where hard dollars are distinctly measured, to say nothing of the experience of having killed or maimed a human being.

The industrial surgeon must do more than relieve pain medically and surgically. Prevention of accidents is worth a pound of cure, and he must organize, wherever his field of duty lies, safety first campaigns. His understanding of how the accident occurred prompts him to ascertain the actual risk each employee is liable to and enables him to eliminate and reduce all risks by providing safeguards to all dangerous machines and places. His knowledge derived from the physical examination records made when the person was employed, gives him the opportunity to select the careful and intelligent workman for hazardous positions and the unfit or maimed for places where danger is nil. The promotion of first aid training, the promulgation of rules for safety, and their discipline and education in caution, incidentally falls to his lot.

In these days when the conservation of man power is necessary, not only from the humanitarian

but the economic point of view, safety, in the prevention of injuries and unnecessary deaths, pays. In 1914 the estimate in accident mortality in the United States was 2.8 per 1000 workers, while in Germany before the war it was .68 per 1000. The U. S. Steel Corporation reduced its accidents 42.6, while the Pennsylvania Railroad shops' reduction was 63 per cent. by the institution of careful safety measures rigidly enforced. Our industrial losses by accident is one of our greatest social evils, and national wastes, and undoubtedly constitutes the second highest cause of poverty and dependency. No one can compute the actual economic losses, the estimate being, roughly, 600 millions of dollars.

Industrial medicine, through the leadership of its personnel, recognized the opportunity during the war, for the rehabilitation of disabled and crippled soldiers. They were familiar with the enormous wastage of man power in industry, due to disability, and realized the wrong that was done by managers in scrapping their employees for whom they were morally responsible. The principle of salving crippled soldiers, applied to the industrial army as well, and as now organized, must continue always. To fulfill our obligations the human scrap heap must be salvaged and human life and energy conserved by physical reconstruction and vocational re-training methods.

In spite of our labors these will be still in our midst: the armless, the legless, the tubercular, the epileptic, and blind, many of whom can be furnished with gainful occupations and so become efficient members of society. Through this fertile field of social endeavor a new profession of physio and occupational therapy has been created. These, mostly women, trained in the arts of massage, physical education, hydro and electro therapy, and occupational methods and psychology, are not only preventing disability from ankylosis of joints, injuries to muscles, etc., but are instrumental in the solution of reclaiming and re-educating the maimed from accident and disease, so that they may be put back on the payroll and preserve their economic independence.

Much is to be expected in the next few years from well-trained men in the new specialty of industrial medicine. The research in occupational and degenerative diseases of the worker is just beginning. The hazards of war industrial plants were studied scientifically and so were revealed the effects of the poisonous dusts and vapors such as Trinitrotuol and the aeroplane dope mixtures. Every new appliance and discovery may have its particular hazards, as for example, the effect of the air hammer on the hands of the stone-cutter, which has been a recent contribution.

In New England forty-five manufacturers consented to contribute $1000 yearly for five years to Harvard Medical School to establish a chair of industrial medicine and surgery. Several of our medical schools have already added teachers and special clinics for this new field, special emphasis being given to traumatic and orthopedic surgery, industrial hygiene and the public health and social welfare work. The graduates to spend one year of internship in industrial hospitals associated with large plants. This shows the great importance that is laid on the subject not only by our medical schools but by the great number of employers who have organized medical departments in their plants. The employer does not have to look on the credit side of the ledger to see whether industrial medicine pays. He knows that medicine scientifically applied has increased efficiency and output, that compensation and loss of time is decreased, and the good will between employer and employee is preserved and strengthened. The employee likewise reaps the benefit in securing healthier working conditions, better care when sick or injured, protection from contagious and occupational diseases, overcoming of loss of wages, and of suffering and thereby increasing his comfort and happiness.

What satisfaction and contentment awaits the specialist who follows such a vocation as this. In the hand of the well-trained industrial surgeon lies the humanizing of industry, which in turn offers to labor and capital social reconstruction and democracy.

THE INDUSTRIAL SURGEON, WHAT HE IS—WHAT HE CAN BE—WHAT HE SHOULD BE.*

By GILBERT M. BARRETT, M. D., F. A. C. S.,
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Many problems are before the medical world and the most of these are pressing for recognition and solution before the Industrial portion of the world.

The Industrial Surgeon of today believes in and advocates examination of all applicants for work. It should be the accepted routine of all industrial enterprises. One of the greatest sources of saving to the employer is the physical selection of employees for work. This is done by the physical examination of all applicants for work before employment. The value to the employer depends upon the thoroughness of these examinations and the amount of co-operation between the employment department, the medical department and the foreman. The placing of all comers on jobs without any effort at a physical selection for their work is responsible for a great financial waste which cannot be shown in dollars and cents, but which, nevertheless, is very evident. Some of the sources of waste from the employment of the physically unfit are given by Mock as:

(a) The unfit who later must be discharged because of inability to do the work.

(b) The unfit who may continue to work for a few months or a year, but with a gradual decrease in their efficiency, due to advancing disease. Sooner or later they are forced to stop work, and during the entire period of employment they have been a source of loss to the company employing them.

(c) Those who, because of their physical condition, are subject to frequent accidents.

(d) Those who suffer accidents which ordinarily would not be serious, but, because of co-

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